

IN THE DRAWINGS

Applicants propose to label the blocks in Fig. 1 of the drawings in accordance with the accompanying ANNOTATED SHEET SHOWING CHANGES.

Enclosed herewith is a REPLACEMENT SHEET in which the above changes have been incorporated.

### REMARKS

Enclosed herewith is a Substitute Specification in which the specification as filed has been amended in various places to correct typographical and grammatical errors, and to also include section headings.

In support of the above, enclosed herewith is a copy of the specification as filed marked up with the above changes.

The undersigned attorney asserts that no new matter has been incorporated into the Substitute Specification.

The claims have been amended to more clearly define the invention as disclosed in the written description. In particular, claim 26 has been cancelled, while claims 24 and 25 have each been made proper independent claims. In addition, the claims have been amended for clarity.

Applicants believe that the above changes answer the Examiner objection under 37 C.F.R. 1.75(c) to claims 24-26, and the Examiner's 35 U.S.C. 112, paragraph 2, rejection of claims 12-14, and respectfully request withdrawal thereof.

The Examiner has rejected claims 1, 2, 11, 22, 23 and 27 under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 6,580,766 to Coene in view of U.S. Patent 5,191,571 to Fukumoto et al. and further in view of U.S. Patent 6,253,345 to Agazzi et al. The Examiner has further rejected claims 12-14 and 20 under 35 U.S.C. 103(a) as being unpatentable over Coene in view of Fukumoto

et al., and further in view of the article "The Capacity and Coding gain of Certain Checkerboard Codes" by Weeks IV et al. Applicants acknowledge that the Examiner has found claims 3-10, 15-19 and 21 allowable over the prior art of record.

The Coene patent, which corresponds to International Patent Application No. WO 00/18016, cited on page 3, paragraph [0004] of the Substitute Specification, discloses a partial response maximum likelihood (PRML) bit detection apparatus, in which an input information signal is sampled, and the sampled information signal is applied to a calculation apparatus.

The Fukumoto et al. patent discloses a tracking control method and apparatus for an optical disc system in which, in order to track a record carrier in which the tracks are spaced at  $1/n$  of the conventional track pitch  $p$ , i.e., at a density of  $n$  times the density of conventional tracks, a plurality of light beams are directed to the record carrier to form a plurality of differential signals.

The subject invention relates to detecting a channel data stream which is stored on a record carrier along an  $N$ -dimensional channel tube,  $N$  being at least two. As described in the Substitute Specification on pages 8 and 9, paragraph [0015], reliable bit detection is achieved using a number of independent 1D Viterbi sequence-detectors, one for each bit row in the channel tube.

Applicants submit that the combining of Fukumoto et al. with Coene does not lead to the invention as claimed in claim 1. In particular, while Fukumoto et al. is concerned with recording densities which may be  $n$  times that of the conventional recording density, each of the tracks are independent from its neighboring track. However, in the subject invention, "[F]or two-dimensional recording, the channel bits of a channel data stream can also be recorded along a spiral, albeit a broad spiral, that consists of a number of bit rows which are aligned with respect to each other in the radial direction, that is, in the direction orthogonal to the spiral direction." (Substitute Specification, page 2, lines 20-25). As such, each of the spiral bit rows in the channel tube is related to its neighboring spiral bit row.

Applicants further submit that the combination of Fukumoto et al. with Coene would lead to a bit detection apparatus which is able to detect the bits in a track on a record carrier in which the tracks have a track density  $n$  times that of a conventional recording density, i.e., a one-dimensional detection. However, there is no disclosure of how such a combination would be able to handle a two- (or more) dimensional recording.

Claim 2 of the subject application claims "wherein the preliminary bit decisions on said primary neighboring bits in the neighboring bit rows are obtained by threshold detection using a slicer level". The Agazzi et al. patent discloses a system and

method for trellis decoding in a multi-pair transceiver system in which a "Viterbi decoder circuit 604 performs 4D slicing of signal received at the Viterbi inputs 614, and computers the branch metrics." (col. 14, lines 27-29). As such, there arguably must be some slicing level(s). However, the mere existence of a Viterbi decoder circuit performing a slicing operation, does not disclose the full limitation of claim 2.

Further, Applicants submit that Agazzi et al. does not supply that which is missing from Coene and Yukumoto et al., i.e., "A Viterbi bit detection method for detecting the bit values of bits of a channel data stream stored on a record carrier along an N-dimensional channel tube, N being at least two, of at least two bit rows one-dimensionally evolving along a first direction and being aligned with each other along at least a second of N-1 other directions, said first direction together with said N-1 other directions constituting an N-dimensional lattice of bit positions".

The Weeks IV et al. article discloses various checkerboard constraints including square and hexagonal. "Checkerboard constraint" is defined in Weeks IV et al. on page 1194, right column, "Definition 1: A *checkerboard constraint* is a two-dimensional arrangement of *zeros* that must surround every one in a two-dimensional binary code."

Applicants submit that it is unclear how this is applicable to the subject invention as claimed in claims 12-14


which relate to a 2D lattice of bits, and particularly with regard to claim 20 which relates to a three-dimensional lattice of bits.

Notwithstanding the above, Applicants submit that Weeks IV et al. does not supply that which is missing from Coene and Fukumoto et al., i.e., "A Viterbi bit detection method for detecting the bit values of bits of a channel data stream stored on a record carrier along an N-dimensional channel tube, N being at least two, of at least two bit rows one-dimensionally evolving along a first direction and being aligned with each other along at least a second of N-1 other directions, said first direction together with said N-1 other directions constituting an N-dimensional lattice of bit positions".

In view of the above, Applicants believe that the subject invention, as claimed, is not rendered obvious by the prior art, either individually or collectively, and as such, is patentable thereover.

Applicants believe that this application, containing claims 1-25 and 27, is now in condition for allowance and such action is respectfully requested.

Respectfully submitted,

by   
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On March 01, 2006  
By Burnett James

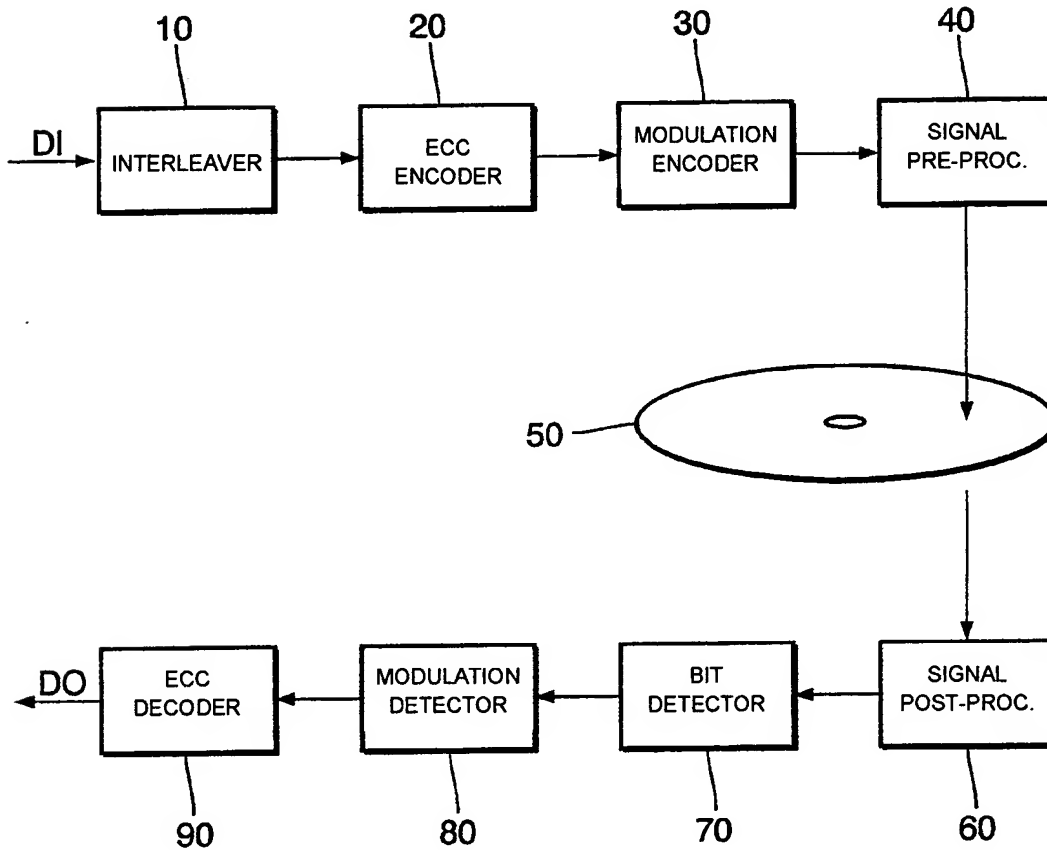


FIG.1

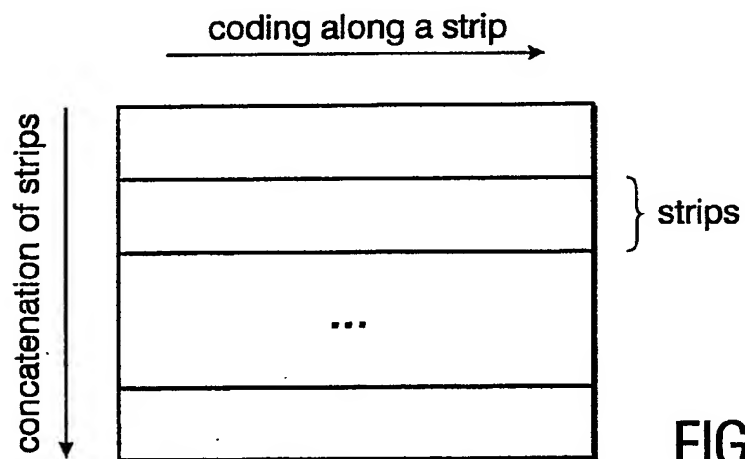


FIG.2